

# InterAgency Board for Equipment Standardization and Interoperability

NDIA Symposium

Los Angeles, CA  
June 2002



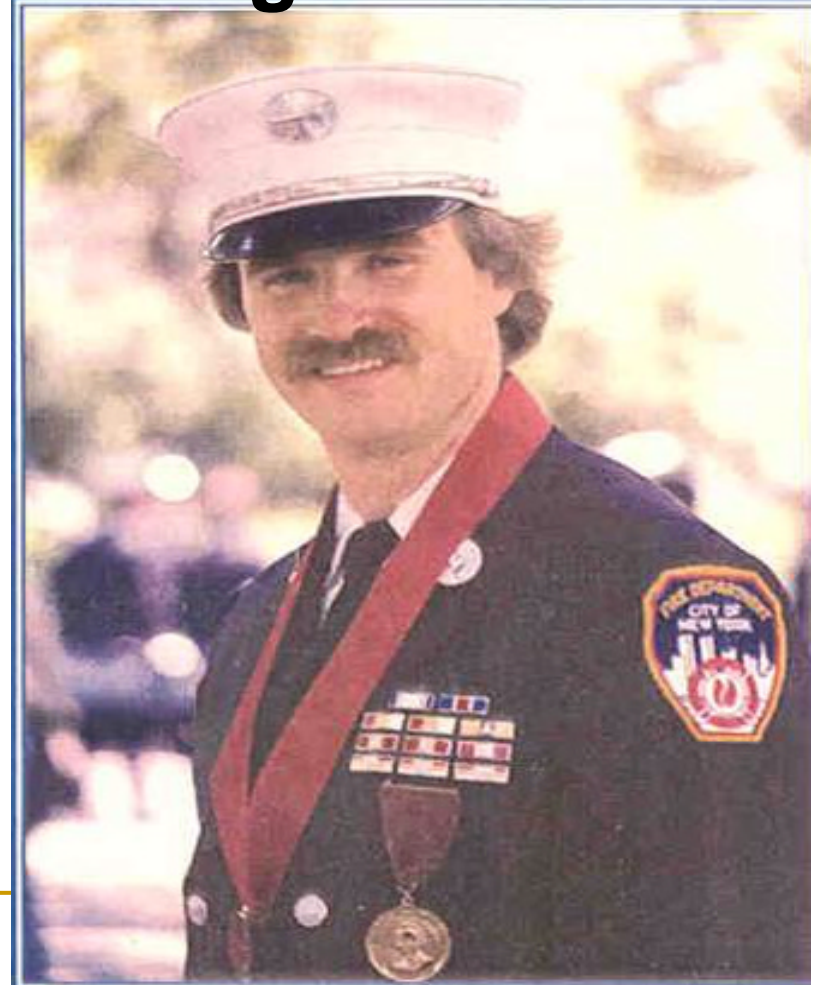
*In Memory  
of the 343  
Fallen Brothers*



IN LOVING MEMORY  
Battalion Chief

# JOHN "JACK" J. FANNING

## Still Responding





# Technologies Used in Construction

## WTC

- 110 story steel office towers (Twin Towers)
- Peak occupancy
  - 50,000 people
- Not Built to NYC Building Code
- Post '93 bombing, Towers were brought into compliance to NYC Local Law 5 (High-rise Fire Protections laws for NYC)





# Satellite Photo - Lower Manhattan



# Post '93 Technologies (WTC)

## WTC

- “State of the art” fire protection system
  - ❑ Fire warden stations
  - ❑ Repeater system
  - ❑ Hard wire communications
  - ❑ Stand pipe phones
  - ❑ Security cameras
  - ❑ Alarm system





## VARIOUS WORLD TRADE CENTER TENANTS

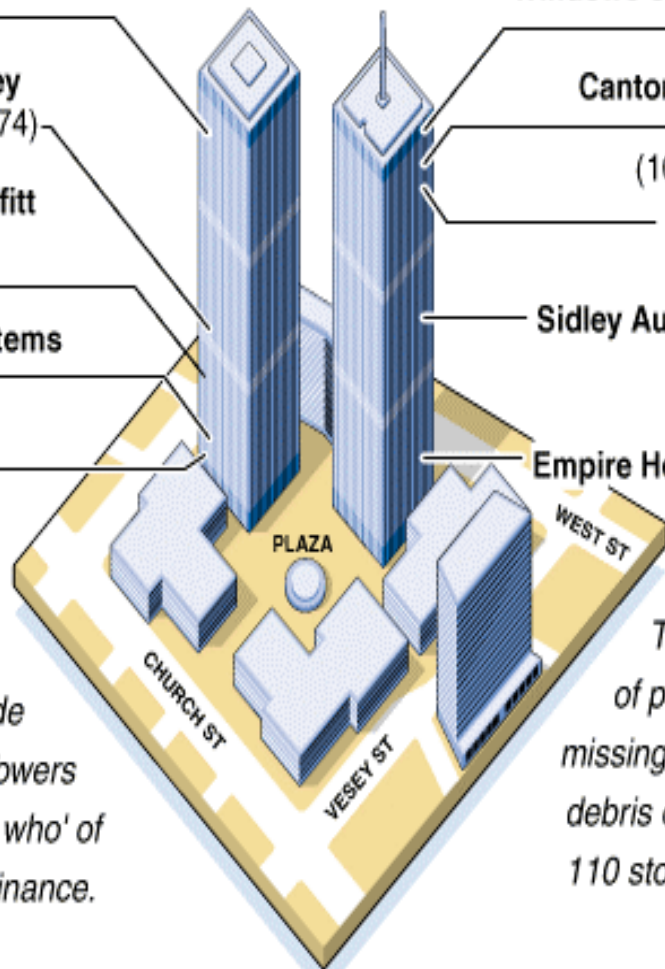
### SOUTH TOWER

- **AON Corp.**  
(92, 98-105)
- **Morgan Stanley**  
(43-46, 56, 59-74)
- **Thatcher, Proffitt & Wood**  
(20, 38-40)
- **Sun Microsystems**  
(25-26)
- **Mancini Duffy**  
(21-22)

### NORTH TOWER

- **Windows on the World**  
(106)
- **Cantor Fitzgerald Securities**  
(101, 103-105)
- **Marsh USA**  
(93-100)
- **Sidley Austin Brown & Wood**  
(54, 56-59)
- **Empire HealthChoice**  
(24-31)

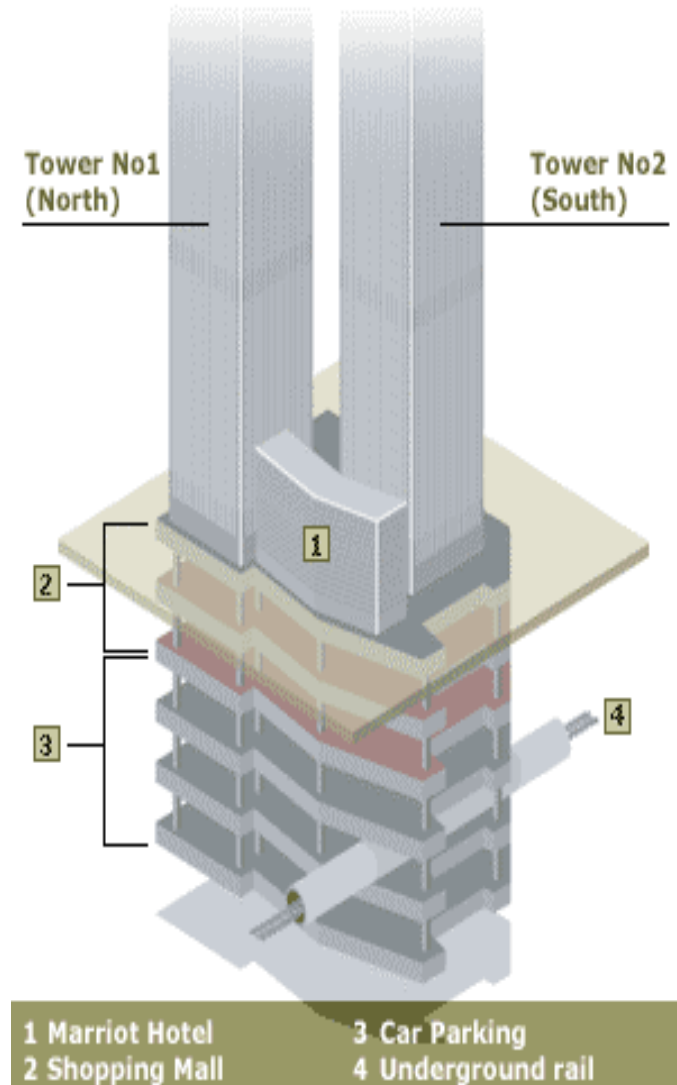
Tenants of the World Trade Center Twin Towers were a 'who's who' of international finance.



Thousands of people are missing amid the debris of the two 110 story towers.

REUTERS

## BELOW THE TWIN TOWERS



1 Marriot Hotel  
2 Shopping Mall

3 Car Parking  
4 Underground rail



# WTC Construction

## WTC

- Center core construction
- Load bearing steel skin
- Light weight, open web bar trusses

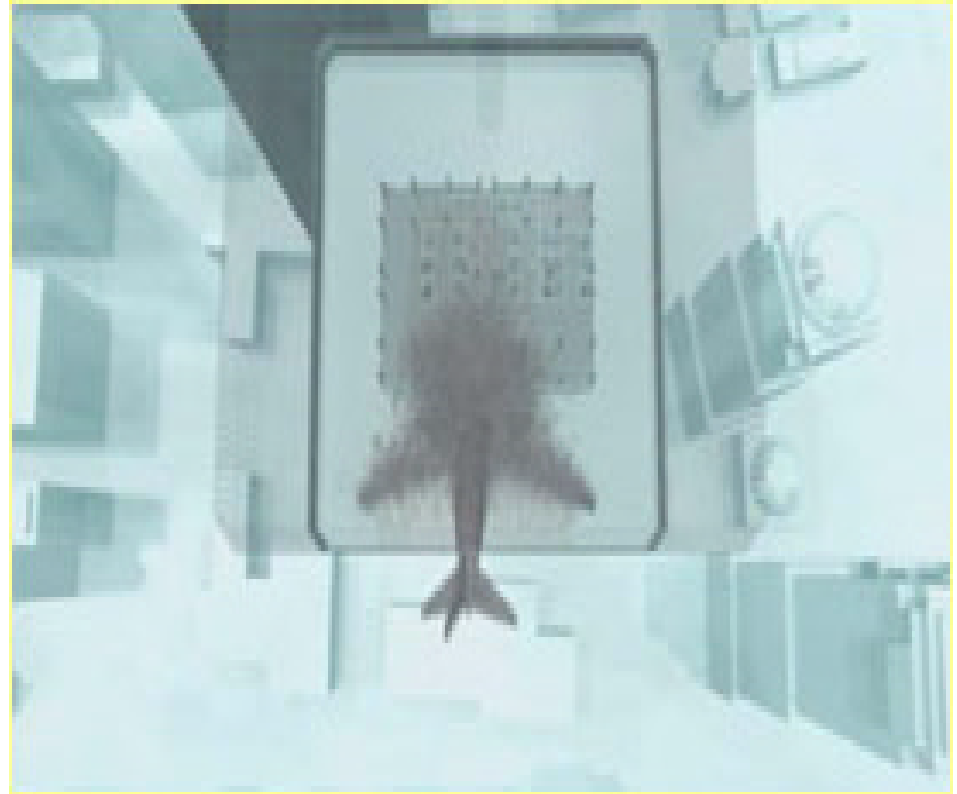


# Light weight steel bar joist



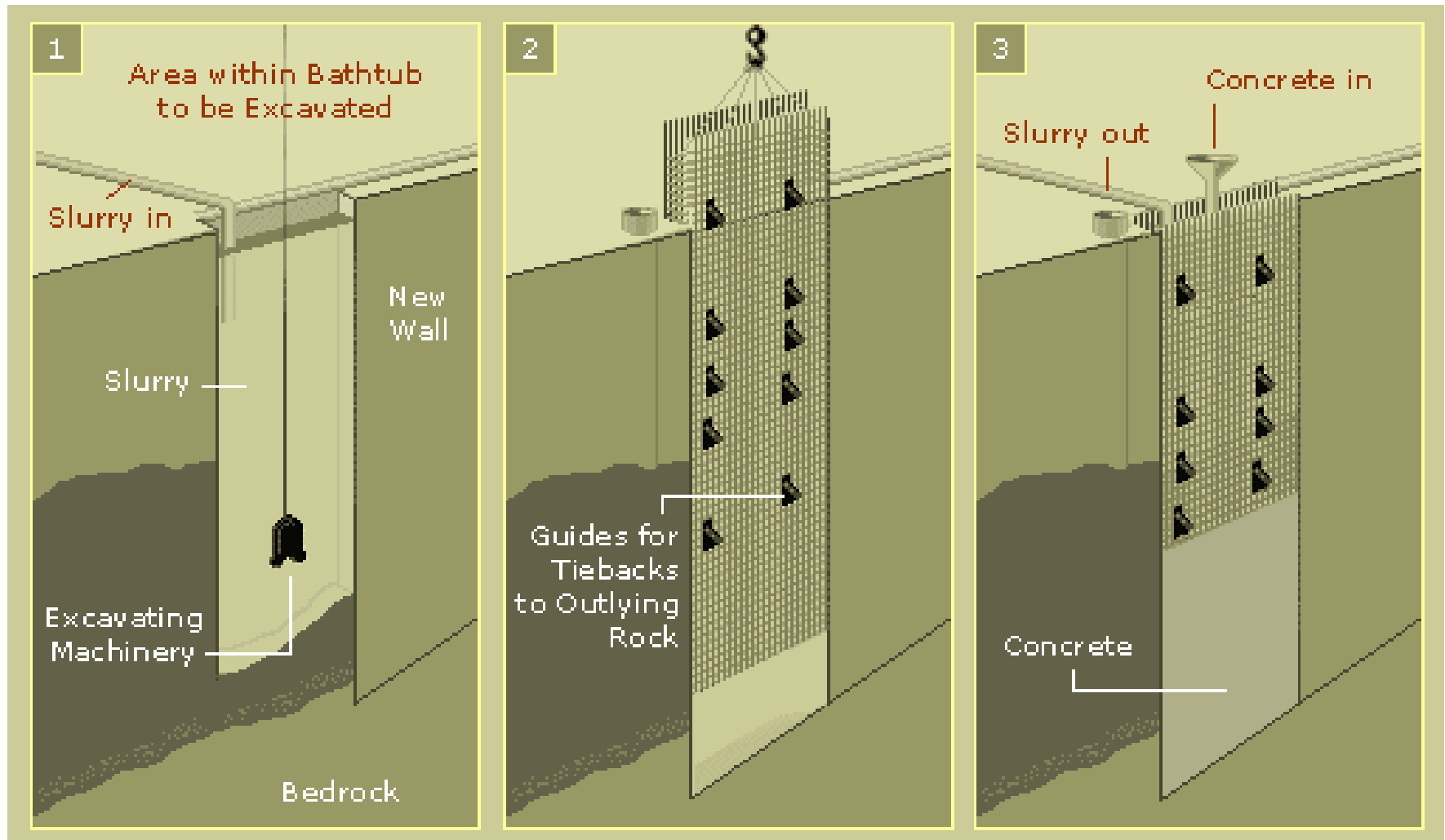
# Technology Problems (WTC)

- Center Core vs Side Core Construction
- Truss vs Solid beams
- Specification code vs performance code
- Double 5/8<sup>th</sup> sheetrock
- “Technology is great if it survives the incident”





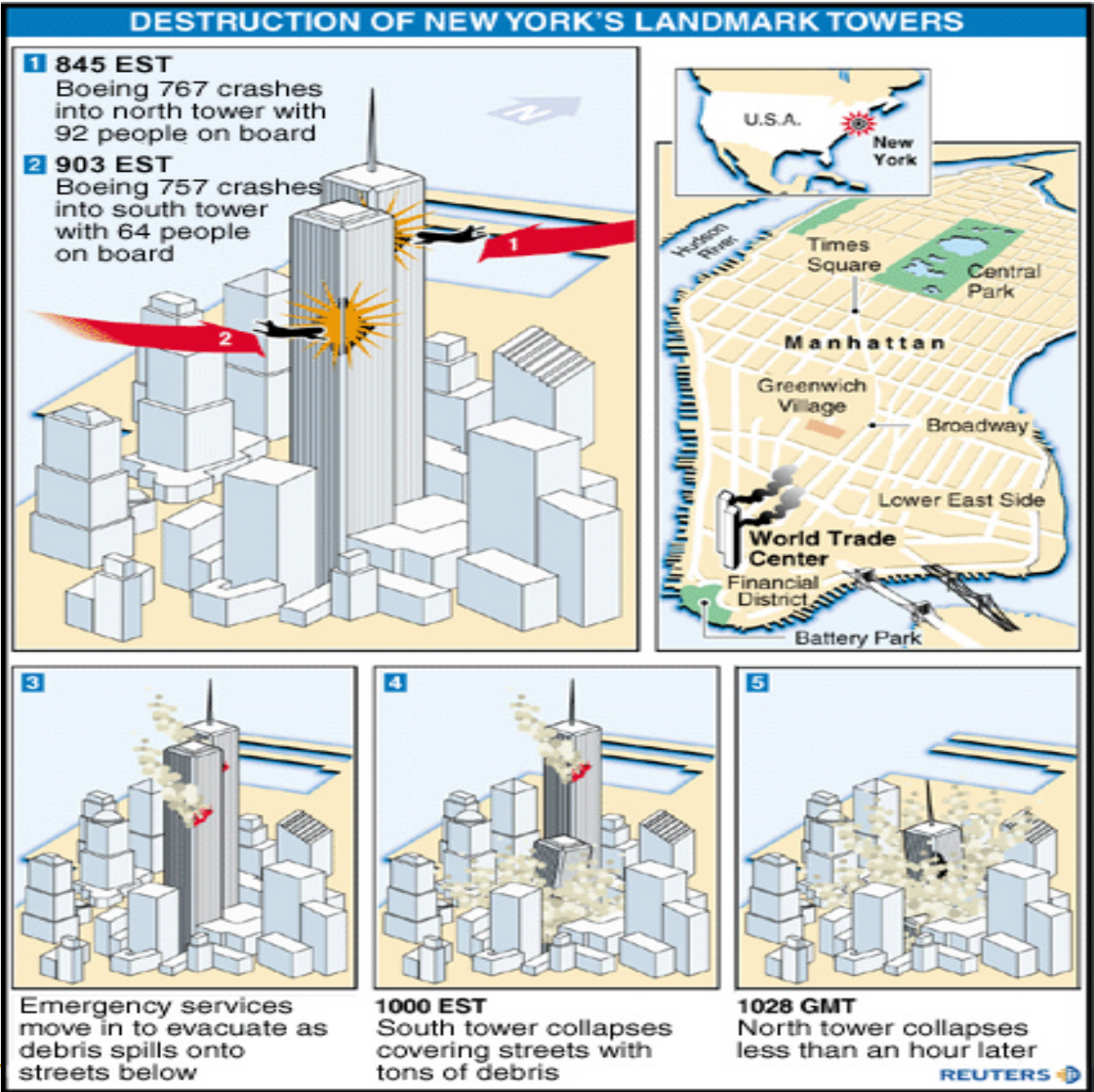
# Slurry wall tie backs



AA Flight 11  
Boston to LAX  
Hit the North Tower at 8:45 AM



United Flight 175  
Boston to LAX  
Hit the South Tower at 9:03 AM



## Flight Paths of Attack





## Satellite Photo of NY & NJ

## Smoke from Burning Towers



# Organizational Issues

- Local 1<sup>st</sup> responders will be the initial units arriving on the scene
- Devotion to duty puts members in “Harm’s way”
- Dangers are overlooked or minimized in order to perform their duty



# Organizational Issues

- Incident generates a response
  - Large Fire response
  - PD and PAPD response
  - EMS response
- Incident Command System established early with the first Fire units





# Organizational Issues

- ICS
  - Two separate events initially (two 5<sup>th</sup> Alarms)
  - Two separate ICS
- Joint Incident Command established by Chief of Department



# Organizational Issues

- What this does
  - ❑ Places majority of leadership in “Harm’s Way”
  - ❑ Places outer areas in a depleted mode for other incidents (FD, PD, PAPD & EMS)



# Organizational Issues

- Initiates recall procedures in all services
  - ❑ Leads to equipment short falls (tools & communications)
  - ❑ Manpower issues
  - ❑ Coordination issues, outside of ICS recommended span of control



# Incident Development

- The incident escalates
  - ❑ Fire command wiped out
  - ❑ Massive losses to all agencies
- Stabilize or Chaos
- Avoidable?
  - ❑ Collapse zones
  - ❑ Communications
  - ❑ Remote command post
  - ❑ SOP's





# FDNY Personnel Killed



- Chief of Department
- 1<sup>st</sup> Deputy Commiss
- 2 Ass't Chiefs
- 18 Battalion Chiefs
- 20 Captains
- 47 Lieutenants
- 250 Firefighters
- 1 Chaplain
- 2 Paramedics
- 1 Fire Marshall
- Total 343



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# FDNY Special Operations

- Haz-Mat Specialists and Technicians
  - Assigned and working in
    - HMC1, 5 Rescues, 7 Squads, SOC, HM-OPS and the Safety Battalion
    - 6 Battalion Chiefs
    - 5 Captains
    - 10 Lieutenants
    - 72 Firefighters
-

# Intra agency Cooperation

- Intra agency US&R team activated
- Specialized members of each agency new each other but the operational member's (where the rubber meets the road) didn't
- Large numbers of specialists were lost



# Intra Agency Cooperation

- ICS reestablished but was delayed for hours because of ensuing chaos
- Quick Transition to Uniform Command because of influx of other local, state and federal assets.



# Emergency Management

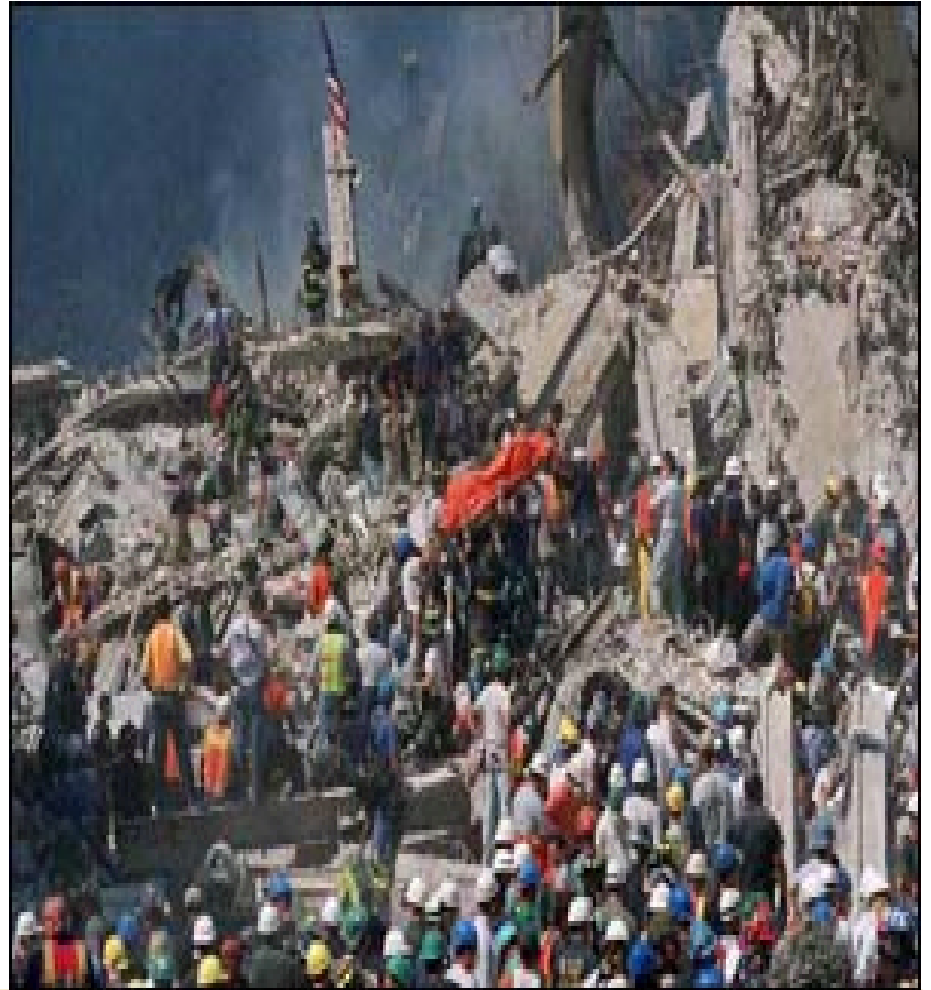
- Heavy losses
- Quickly reestablished within days to deal with coordination of resources and state and federal assets





# Technologies Deployed (WTC)

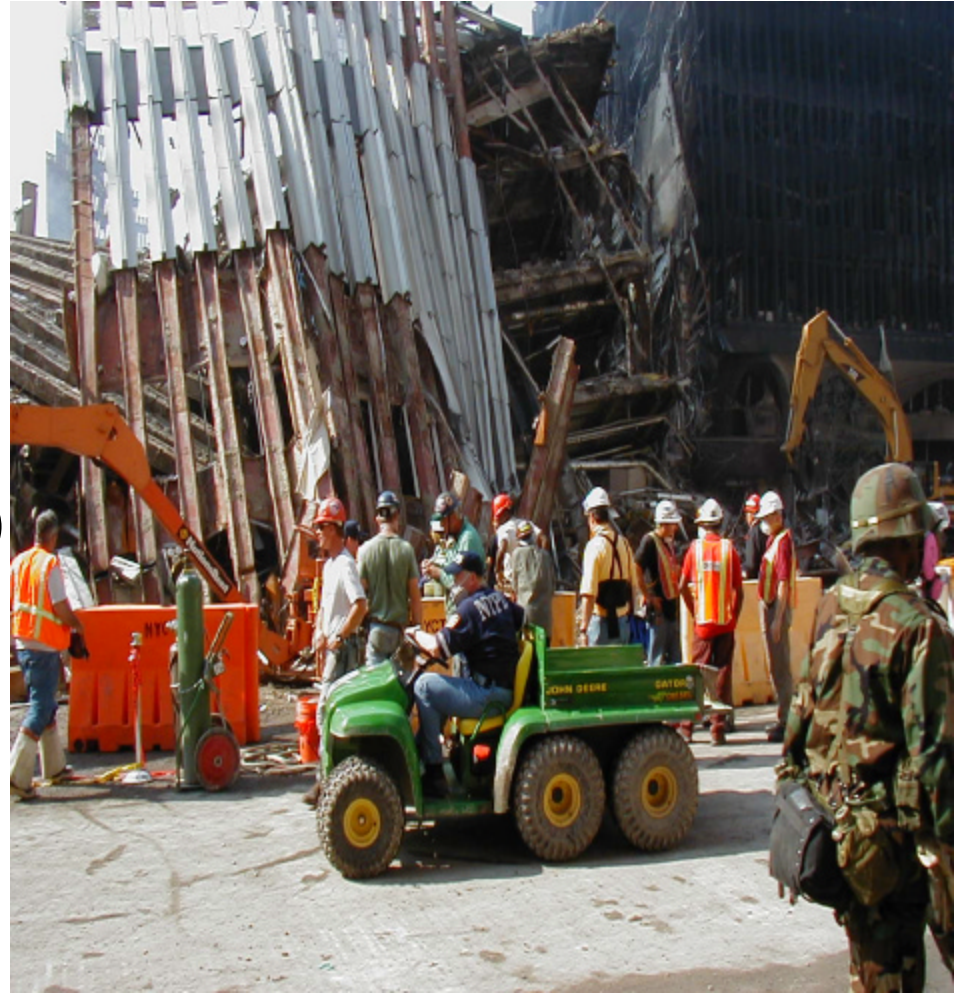
- Initially: pick & shovel
- Bucket Brigades
- US&R: Hazmat
  - Cams
  - Radiological equipment
  - CGI (Five Star)
  - GC/MS (air monitoring)
  - OSHA air monitoring equipment



# Technologies Deployed (WTC)

## Search & Rescue

- Hand tools
- Heavy Equipment
- Cordless hand tools (Saws, Sawzalls, Lighting, Rebar cutters)
- Search Cams
- Robot platforms
- Gators
- Ultra sound



# Technologies Deployed (WTC)

## Planning

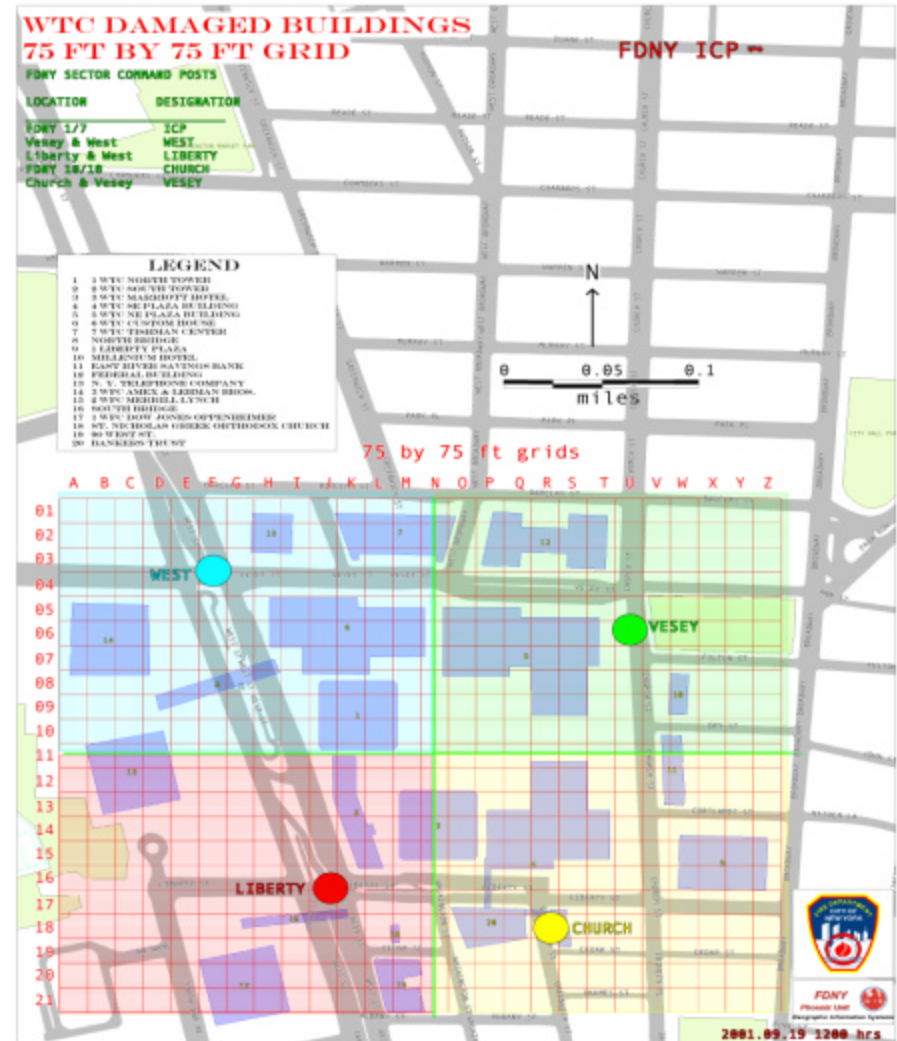
- Incident Command software
- GIS (Geographic Information System)
- GPS (Global positioning system)
- Where are the victims located and how do we plot the locations ?





# Geographic Information System

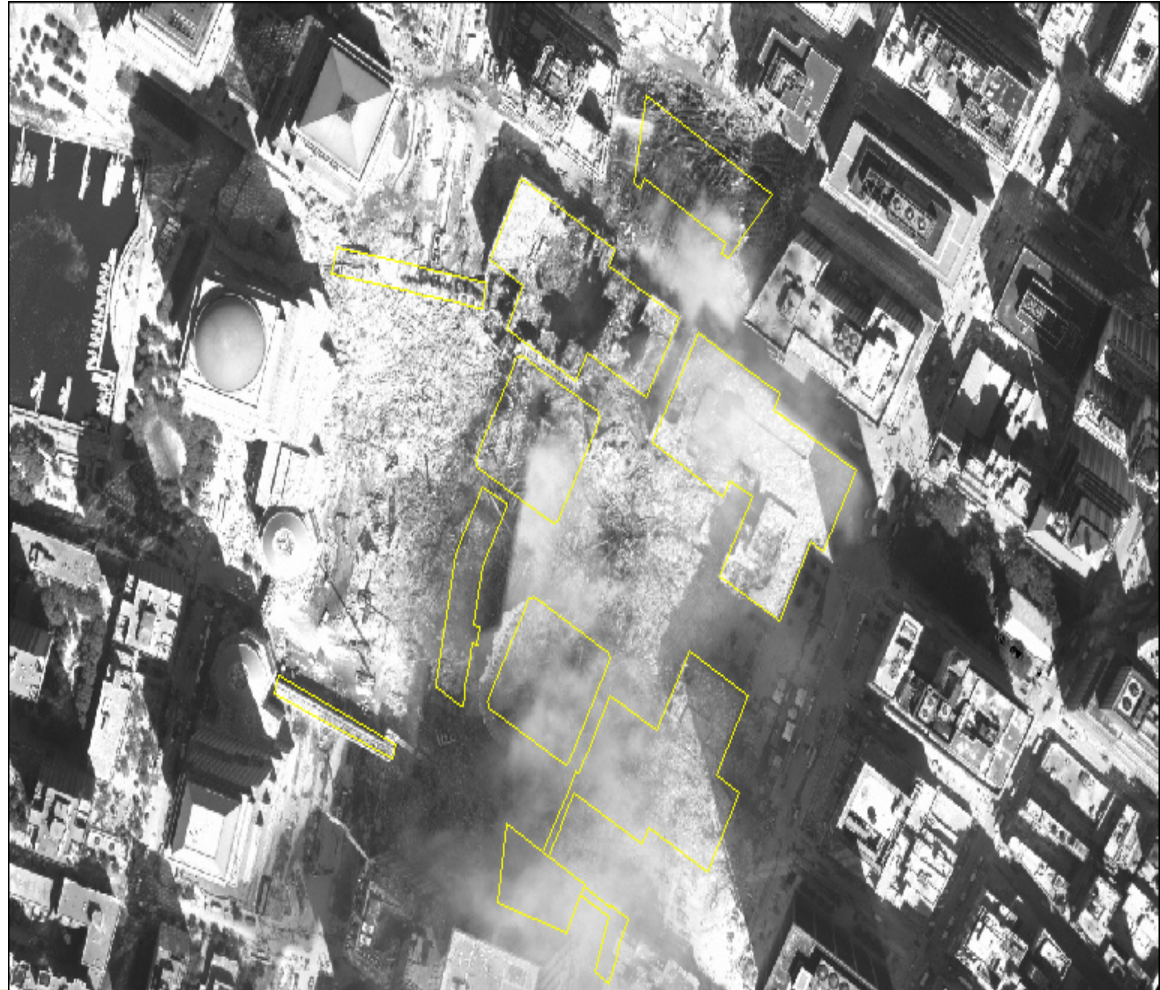
- GIS from FDNY Phoenix Unit
  - Creates maps of area
  - Superimposes grid system
    - 16 plus acres
    - 4 sectors created
      - 75' x 75' grid



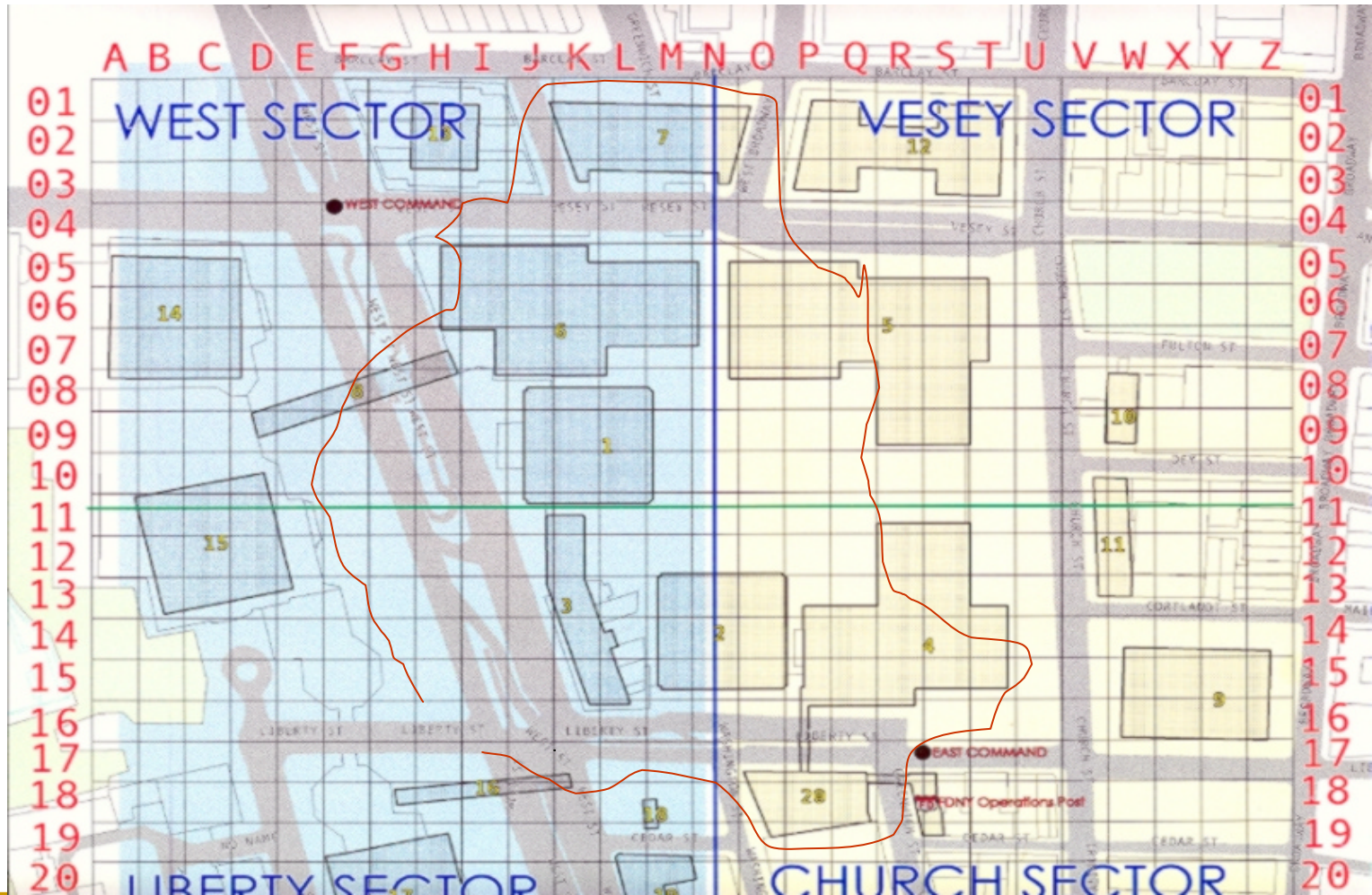


# Geographic Information System

- Orthographic Technology
- Able to superimpose foot print of damaged buildings onto satellite photos



# Geographic Information System



- Able to superimpose outlines of debris fields

# Technological Problem ?

- We can grid out the site - slow, intensive project. Firefighters estimate location in the grid.
- How can we keep track of the data?
- Technologies to help
  - ❑ Laser Ranging Technology or Global positioning Technology
  - ❑ Bar code technology



# Solution

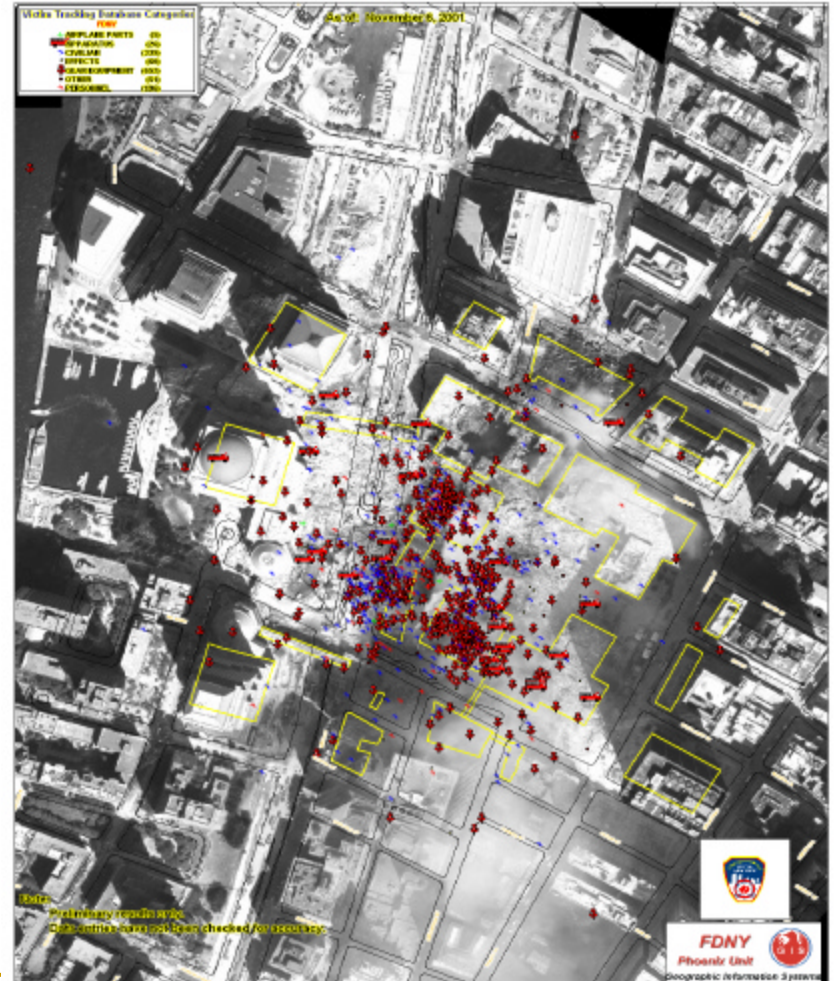
- Symbol Technologies would combine a GPS system with their bar code readers.
- This produced a rugged, hand held (Firefighter proof) instrument with a downloadable data system



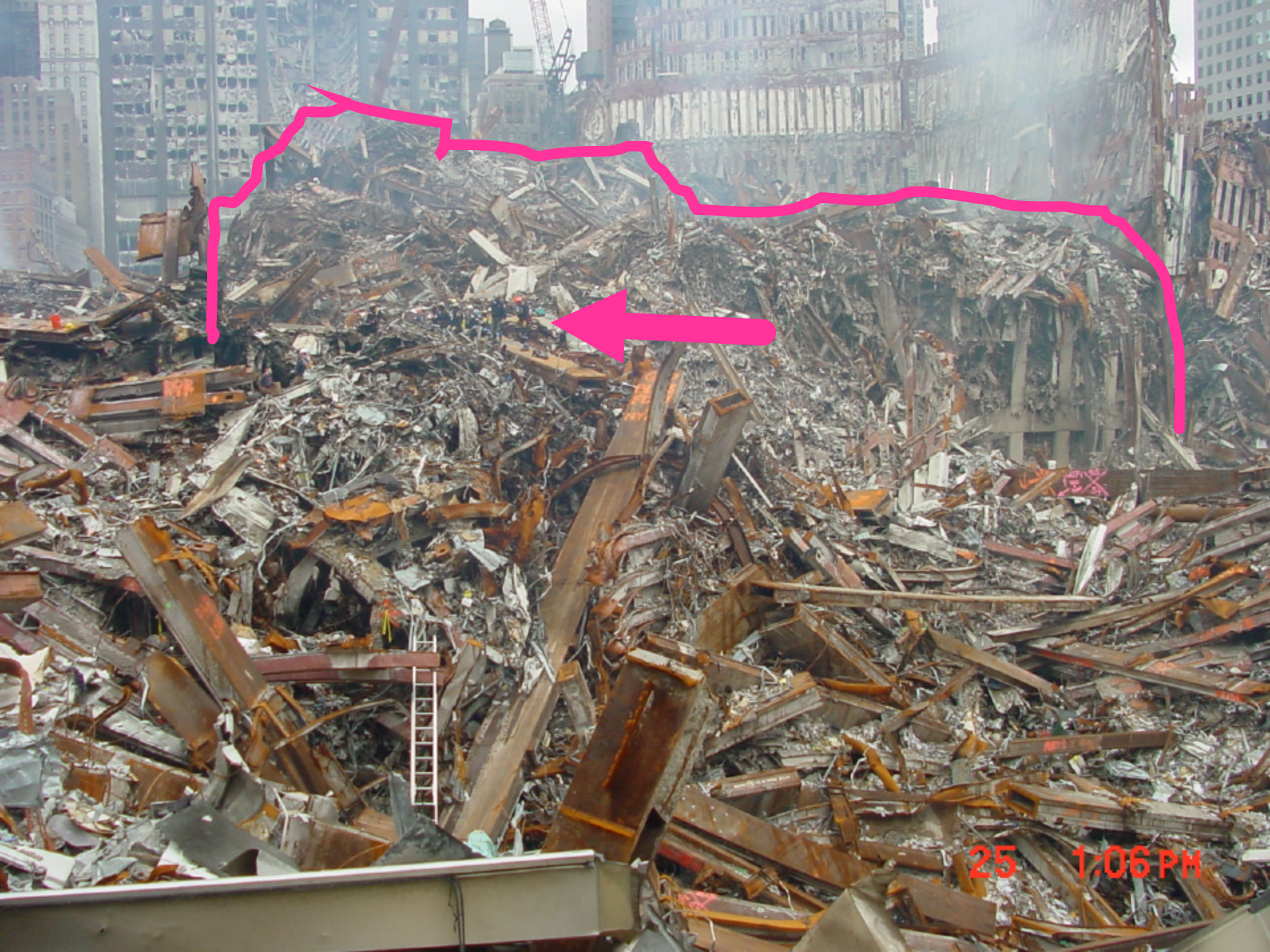


# Global Positioning System

- X and Y axis was able to be plotted
- Location of bodies and body parts
- Location of equipment
- Able to recreate events of the day
- Evidence collection
- Info to families

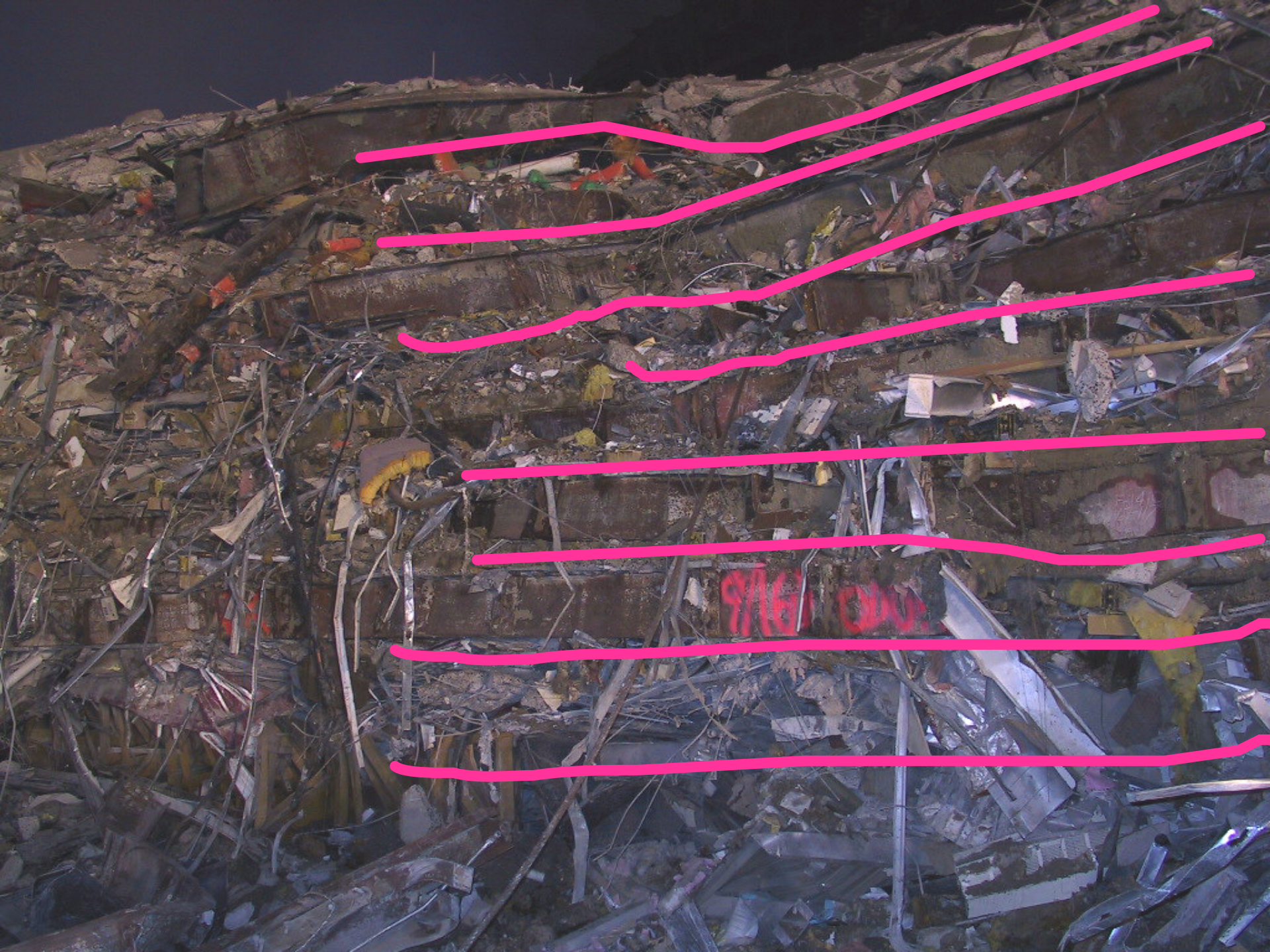






25 1:06 PM







# Existing Technology Gap

- Z – axis capability in urban area
- Signal improvement in urban areas





# WTC Problem

- Fire in debris pile hampering rescue and recovery operations
- Deep seated out of range of standard firefighting techniques
- Pyrocool Technologies



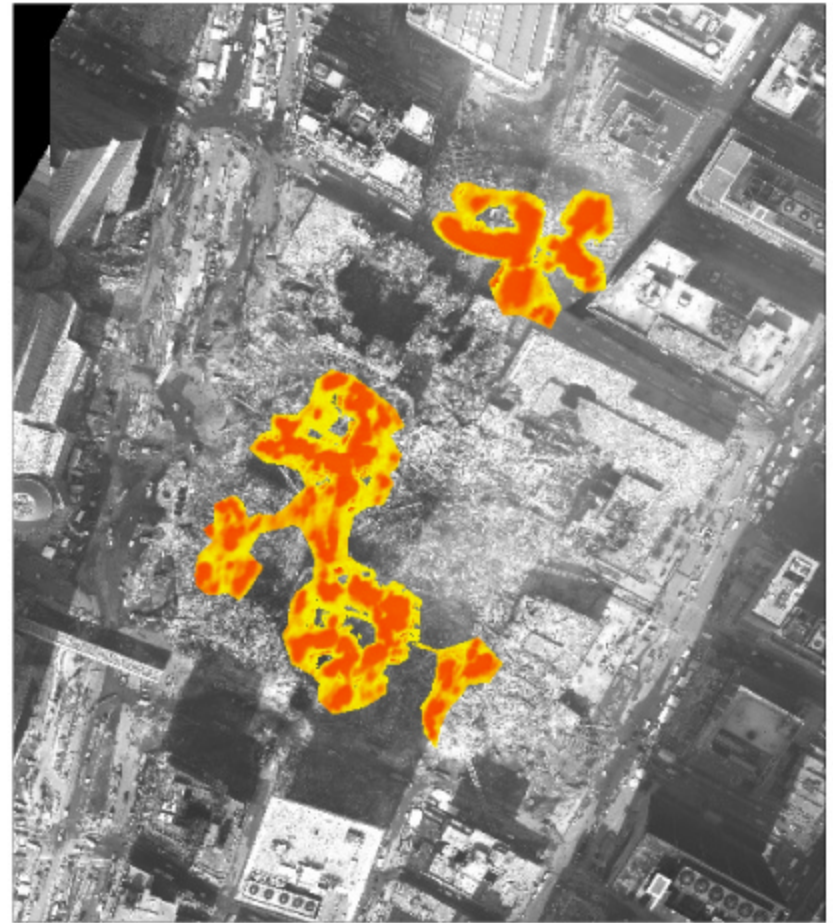
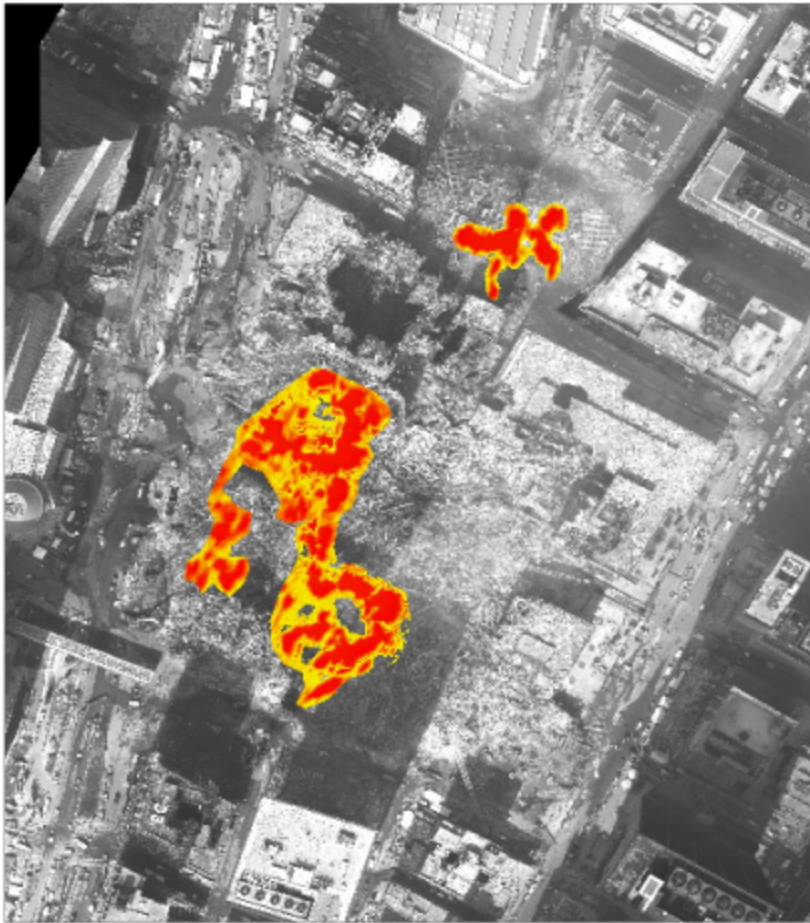
# Thermal Imaging

- Able to map out extent of heat fields in pile
- Daily tracking
- Used Pyrocool foam additive.
- Tracked its progress daily



# Thermal Imaging

Thermal Image from 22 and 23 Sep 2001



Rapid Mapping and Information Analysis Cell (MITRE)

Disclaimer: The MITRE Corp. does not certify the correctness of any information provided on this map and is not liable for any actions taken or not taken by any persons.



# Command Post

- Current technology lacks
- Need new software programs to allow commanders to access IC's from distant locations
- Need telephone to microphone communications





# Scene Security

## Lessons Learned

- Perimeter Control ASAP
- Large area made it difficult
- PD, Military
- Physical fencing/barriers
- “Volunteer Control”
- Credentialing
- Access/Egress Control
- Looting
- Press-official & unofficial



Scene Security:

# Evidence (Plane)

## Lessons Learned



- Plane parts
- Depleted Uranium?
- Central collection area
- Personal items

Scene Security:

# DEA – Drug Caches

Lessons Learned



- Exposed
- Looters
- Detailed security in harm's way
- Which agency does security? PD, DEA, ATF, FBI, PAPD?

# USSS- Arms Cache WTC Building #7

## Lessons Learned



- WTC Building #7
- OEM Command Bunker
- Do not build on 23<sup>rd</sup> flr
- Do not locate next to 2 biggest targets in city
- Do not put all of your control eggs in one basket



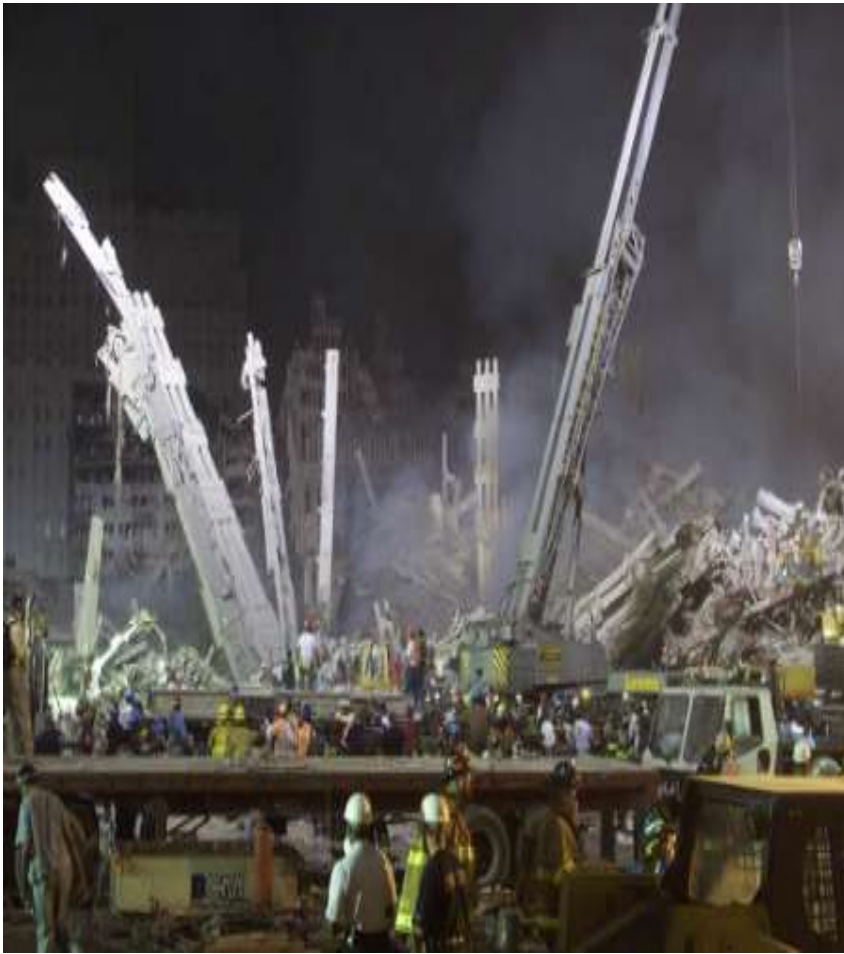
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# Scene & Perimeter Control

- Civilians evacuated from residential buildings
  - Small Store owners
  - Financial Businesses in immediate area
  - Curious onlookers
  - “Volunteers”
-

# Night Operations

## Lessons Learned



- Lighting
- Fuel source, Propane or diesel fuel
- Maintenance
- Portability or Fixed
- Safety concerns

# Lessons Learned





**Lessons Learned**



# Lessons Learned



# Terrain Obstacles

## Lessons Learned



- Motorized movement
- Small spaces
- Long distances
- Equipment transport
- Command Vehicles
- Medical units
- All terrain
- Theft-steering/wheel removable



# Metal

## Lessons Learned

- Evidence
- Clues for failure
- What Happened?



# Cleared Area

## Lessons Learned

- Spread out digging for search
- Spread it out again
- Send to land fill area for conveyor belt search





# Facing NW

## Lessons Learned

- Verizon building in center
- 1 Financial Center to left (AMEX Building)
- North roadway
- South (10/10) roadway



# Ramp Construction

## Lessons Learned

- External ramp to release earthen ramps for excavation
- Preservation of remains





# Stairway

## Lessons Learned

- Six stories down
- Enclosed stairway
- Multiple stairways





# Facing NE-January 2002

- Church Street to right
- Transfer point of debris
- Another whole presentation-tracking of debris from site to landfill sifting operation



# Floors Below

## Lessons Learned

- Need to be searched
- Need to be checked for stability of debris field and recovery operations



# Floors Below-March 2002

## Lessons Learned

- Need to be searched
- Need access to areas to check for stability and utilities
- Multiple access routes
- Hazmats
- Looters
- Subways/Trains
- Need for ladders, boats for access to underground areas





# Technologies Gap (WTC)

## Lessons Learned

### Operations

- APR (Air Purifying Respirators) with improved canisters for Bio
- Firefighter locator systems, X,Y & Z axis capability
- Firefighting foams for deep seated fires
- Vehicle locators that work in urban areas
- Multi frequency repeater systems for buildings
- Improved communications and interoperable communications
- Command post software with off-sight capability via radio modems

# Most Important Gap

## Lessons Learned

We need the engineering profession to listen to the Fire Service when designing buildings. We fully realize that the profession is driven by customer oriented concerns (wide open floor space, increased rentable areas, cheaper, lighter weight construction, etc), but there has to be a happy medium between fire safety and customer satisfaction.

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